MS2690A/MS2691A/MS2692A
and MS2830A
Signal Analyzer
Operation Manual
Phase Noise Measurement Function
Remote Control

Fifth Edition

- **For safety and warning information, please read this manual before attempting to use the equipment.**
- **Additional safety and warning information is provided within the "MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Mainframe Operation)". Please also refer to this document before using the equipment.**
- **Keep this manual with the equipment.**

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Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

⚠ DANGER   This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

⚠ WARNING   This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

⚠ CAUTION   This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.

This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

MS2690A/MS2691A/MS2692A and MS2830A
Signal Analyzer
Operation Manual   Phase Noise Measurement Function   Remote Control

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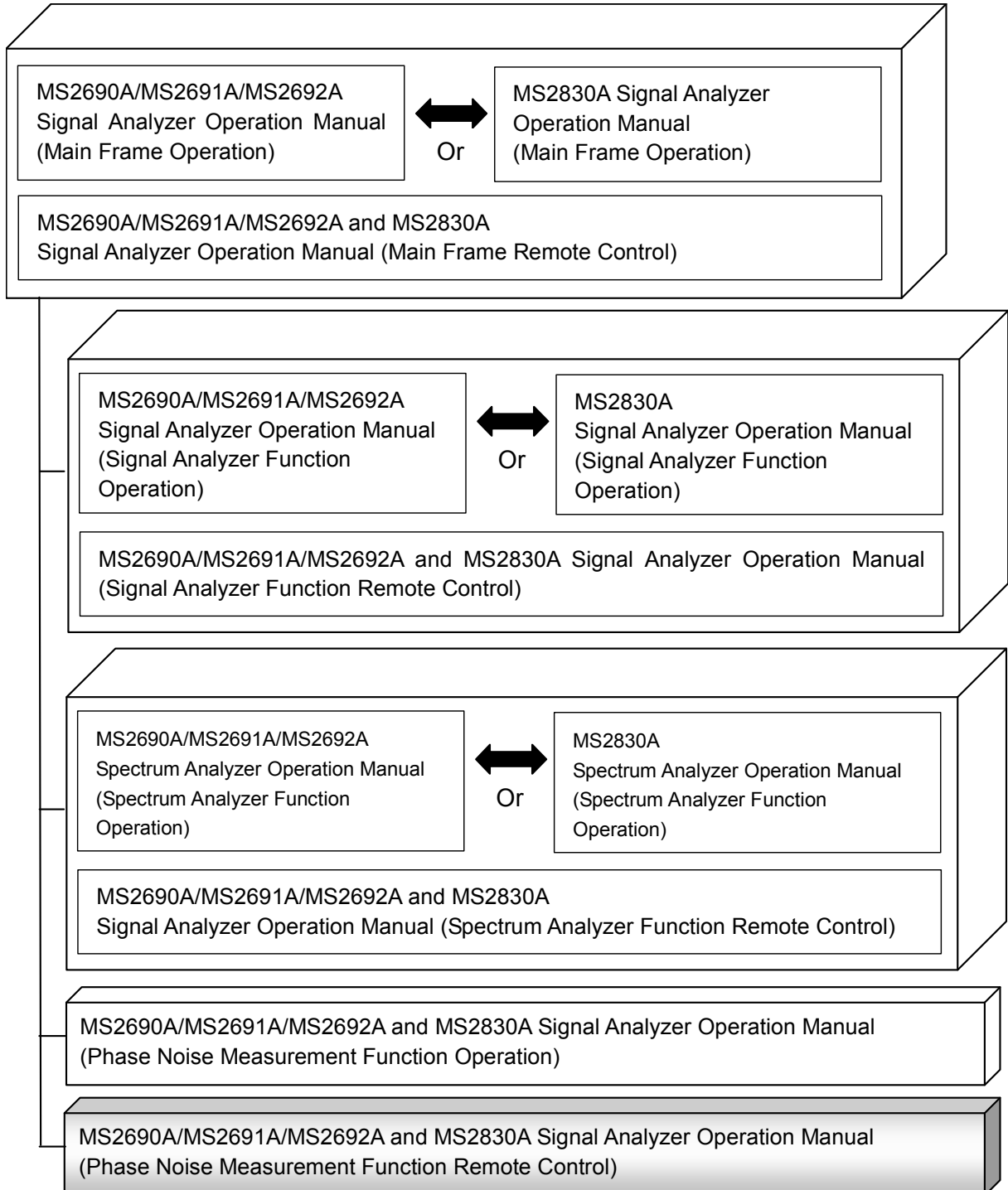
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About This Manual

■ Associated Documents

The operation manual configuration of the MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer is shown below.

MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Main Frame Operation)	⬌ Or	MS2830A Signal Analyzer Operation Manual (Main Frame Operation)

MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Main Frame Remote Control)

MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)	⬌ Or	MS2830A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)

MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Signal Analyzer Function Remote Control)

MS2690A/MS2691A/MS2692A Spectrum Analyzer Operation Manual (Spectrum Analyzer Function Operation)	⬌ Or	MS2830A Spectrum Analyzer Operation Manual (Spectrum Analyzer Function Operation)

MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)

MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Phase Noise Measurement Function Operation)

MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Phase Noise Measurement Function Remote Control)

- Signal Analyzer Operation Manual (Mainframe Operation)
- Signal Analyzer Operation Manual (Mainframe Remote Control)

  Description of basic operations, maintenance procedures, common functions and common remote functions of the mainframe

- Signal Analyzer Operation Manual (Signal Analyzer Function)
- Signal Analyzer Operation Manual (Signal Analyzer Function Remote Control)

  Description of basic operations, functions and remote functions of the signal analyzer

- Signal Analyzer Operation Manual (Spectrum Analyzer Function)
- Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)

  Description of basic operations, functions and remote functions of the spectrum analyzer

- Signal Analyzer Operation Manual (Phase Noise Measurement Function)
- Signal Analyzer Operation Manual (Phase Noise Measurement Function Remote Control)   <This document>

Description of basic operations, functions and remote functions of the Phase Noise

Table of Contents

1

2

3

IV.

Chapter 1   Overview

This chapter provides an overview of the remote control of the Phase Noise Measurement Function (hereinafter, referred to as "this application").

1

Overview

1.1 Overview

This application can be controlled from an external controller (PC) by remote control commands using the MS2690/MS2691/MS2692A or MS2830A Signal Analyzer (hereinafter, referred to as "this instrument"). The remote control commands are defined by the SCPI format.

1.1.1 Interface

This instrument has GPIB, Ethernet, and USB interfaces for remote control. Those interfaces cannot be used at the same time.

The interface is automatically determined when a command is received at the start of communication. This instrument enters the remote state after the interface has been determined. The front panel ^{Remote} lamp lights during remote interface operation, and goes off during local-interface operation.

Refer to the "MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Mainframe Remote Control)" for more details of the basic operations for remote control, such as interface setting.

1.1.2 Controlled Application

Two types of the remote control commands can be used with this instrument: commands that are commonly applied to this instrument itself or all the applications (hereinafter, referred to as "Common commands"), and the other commands unique to the applications. Common commands can be executed at any time and do not depend on the currently controlled application. However, commands unique to an application can be executed at the controlled application. If it is executed at another application, the command is not executed or an error occurs.

In this instrument, multiple applications can be activated at the same time. Only one application resource can be executed at one time per piece of hardware. This application measures an input signal by using the resource of RF Input. Thus, this application cannot be executed at the same time with another application using the same resource such as the signal analyzer function. In order to execute a function unique to the application by using the remote control, you need to select this application while it has been running. Furthermore, this application can be executed at the same time with another application that uses by itself a resource not used by this application, such as the Vector Signal Generator option.

1

Overview

1.2 Native Mode

In this instrument, the syntax/format types of the remote control commands are defined as "Language mode." The language mode has two modes: SCPI and Native.

(1)   SCPI mode
The SCPI mode processes commands conforming to the syntax/format defined in SCPI (ver1999.0). For programming, you can use character strings in long/short form and can omit definition character strings within square brackets ([ ]).

On the Configuration screen, the SCPI mode is automatically set after transmitting command `SYST:LANG SCPI`.

(2)   Native mode
The Native mode processes commands that are in this instrument's own definition type. Unless otherwise specified, the character string of a command header is fixed. If application commands are defined only by the SCPI mode, character strings converted according to the conversion rules are the commands in the Native mode. For programming, you cannot use the grammar of the SCPI mode, such as character strings in long/short form and cannot omit any definition character strings within square brackets ([ ]).

On the Configuration screen, the Native mode is automatically set after transmitting `SYST:LANG NAT`.

Note:
The `STATus:QUEStionable` and `STATus:OPERation` registers cannot be used in the Native mode, even if the corresponding commands are converted to Native-mode commands according to the conversion rules.
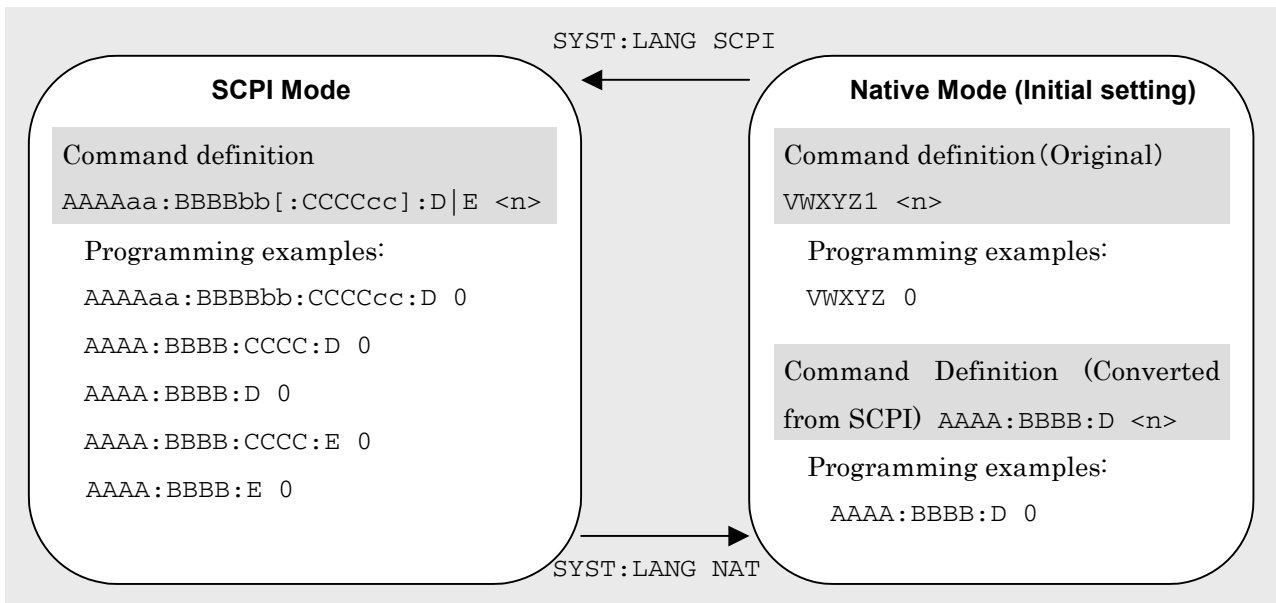
Figure 1.2-1   SCPI and Native modes

This application is only defined as the SCPI mode commands. You need to follow the conversion rules below in order to control this application by using the Native mode.

Conversion Rules

[1]   Move the numeric parameter in the program header of an SCPI command before the argument. Delete a numeric parameter which only has one value and can be deleted. Describe the argument if it cannot be deleted.

[2]   Use the first one if multiple nodes can be selected.

[3]   Delete those layers which can be deleted.

[4]   Alter all long forms into short forms.

[5]   Delete the colon mark ("∶") at the head.

Example

To convert `:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>` into a Native mode command.

[1]   Delete a numeric parameter in the program header which only has one value and can be deleted.
      `:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>`
      ↓
      `:DISPlay:WINDow:TRACe:Y:[SCALe]:RLEVel <real>`

[2]   Delete those layers which can be deleted.

`:DISPlay:WINDow:TRACe:Y`**`[:SCALe]`**`:RLEVel <real>`

↓

`:DISPlay:WINDow:TRACe:Y:RLEVel <real>`

[3]   Alter all long forms into short ones.

`:DISPlay:WINDow:TRACe:Y:RLEVel` `<real>`

↓

`:DISP:WIND:TRAC:Y:RLEV <real>`

[4]   Delete the colon mark ("`:`") at the head.

`:``DISP:WIND:TRAC:Y:RLEV <real>`

↓

`DISP:WIND:TRAC:Y:RLEV <real>`

1.3   Setting Numeric Program Data

The following character programs can be used for setting numeric program data (numeric parameter).

(1) `DEFault`

   After `DEFault` is set to numeric program data, the target parameter is set to the initial value.

(2) `MINimum`

   After `MINimum` is set to numeric program data, the target parameter is set to the minimum value.

(3) `MAXimum`

   After `MAXimum` is set to numeric program data, the target parameter is set to the maximum value.

In this application, `DEFault`, `MINimum`, and `MAXimum` can be used for the following parameters.

   `<freq>`

   `<real>`

   `<rel_ampl>`

   `<rel_power>`

   `<integer>`

   `<rel_freq>`

Chapter 2 SCPI Device Message Details

This chapter describes the detailed specifications of SCPI remote control commands for executing the functions of this application. The device messages are listed according to each function. Refer to the "MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Mainframe Remote Control)" for the detailed specifications of the IEEE488.2 common device messages and application common device messages.

2

SCPI Device Message Details

2.1 Selecting Application

Table 2.1-1 lists the device messages for setup operations such as starting/selecting/initializing an application.

Table 2.1-1   Selecting Application

Parameter	Device Message
Load Application	`:SYSTem:APPLication:LOAD PNOISE`
Unload Application	`:SYSTem:APPLication:UNLoad PNOISE`
Application Switch	`:INSTrument[:SELect] PNOISE`
	`:INSTrument[:SELect]?`
Application Status	`:INSTrument:SYSTem PNOISE,[ACTive]|INACtive|MINimum`
	`:INSTrument:SYSTem? PNOISE`
Initialization	`:INSTrument:DEFault`
	`:SYSTem:PRESet`

2.1.1   Load Application

:SYSTem:APPLication:LOAD PNOISE

Load Application

Function

Activates this application.

Command

:SYSTem:APPLication:LOAD PNOISE

Details

This function activates an installed application and registers it to the Application Switch menu.

Example of Use

To activate this application.
SYST:APPL:LOAD PNOISE

:SYSTem:APPLication:UNLoad PNOISE

Unload Application

Function

Exits this application.

Command

:SYSTem:APPLication:UNLoad PNOISE

Details

This function exits the active application and deletes it from the Application Switch menu.

Example of Use

To exit this application.
SYST:APPL:UNL PNOISE

2.1.2   Selecting Application

:INSTrument[:SELect] PNOISE|SIGANA|SPECT|CONFIG

Application Switch

Function

Selects the control-targeted application.

Command

```
:INSTrument[:SELect] <apl_name>
```

Parameter

```
<apl_name>          Application name
    PNOISE          Phase Noise
    SIGANA          Signal Analyzer
    SPECT           Spectrum Analyzer
    CONFIG          Config
```

Details

This function selects the control-targeted application.

Example of Use

To switch the control-targeted application into the phase noise measurement function.

```
INST PNOISE
```

:INSTrument[:SELect]?

Application Switch Query

Function

Reads out the control-targeted application.

Query

:INSTrument[:SELect]?

Response

<apl_name>

Parameter

<apl_name>	Application name
PNOISE	Phase Noise
SIGANA	Signal Analyzer
SPECT	Spectrum Analyzer
CONFIG	Config

Example of Use

To read out the control-targeted application.
INST?
> PNOISE

:INSTrument:SYSTem PNOISE,[ACTive]|INACtive|MINimum

Application Status

Function

Selects the control-targeted application by specifying the window status.

Command

```
:INSTrument:SYSTem <apl_name>,<window>
```

Parameter

`<apl_name>`	Application name
PNOISE	Phase Noise
SIGANA	Signal Analyzer
SPECT	Spectrum Analyzer
CONFIG	Config
`<window>`	Window status
ACTive	Active status
INACtive	Inactive status
MINimum	Minimized
When omitted	Active status

Example of Use

To select the phase noise measurement function while the window is active.

```
INST:SYST PNOISE,ACT
```

:INSTrument:SYSTem? PNOISE

Application Status Query

Function

> Reads out the application status.

Query

> :INSTrument:SYSTem? PNOISE

Response

> <status>,<window>

Parameter

> <status>   Application status
>   CURR   Executed and targeted for control
>   RUN   Executed but not targeted for control
>   IDLE   Loaded but not executed
>   UNL   Not loaded
>
> <window>   Window status
>   ACTive   Active status
>   INACtive   Inactive status
>   MINimum   Minimized
>   NON   No window display

Example of Use

> To read out the application status.
> INST:SYST? PNOISE
> > CURR,ACT

2.1.3   Initialization

:INSTrument:DEFault

Initialization

Function

Initializes the setting and the status of the selected application.

Command

```
:INSTrument:DEFault
```

Example of Use

To initialize the setting and the status of the selected application.
```
INST:DEF
```

:SYSTem:PRESet

Initialization

Function

This command initializes the setting and the status of the selected application.

Command

```
:SYSTem:PRESet
```

Example of Use

To initialize the setting and the status of the selected application.
```
SYST:PRES
```

2.2 Setting Basic Parameter

This section describes parameters commonly applied to this application, such as frequency and level.

Table 2.2-1 Basic Parameter Settings

Parameter	Device Message
Carrier Frequency	`[:SENSe]:FREQuency:CENTer <freq>`
	`[:SENSe]:FREQuency:CENTer?`
Frequency Start Offset	`[:SENSe]:FREQuency:OFFSet:STARt <rel_freq>`
	`[:SENSe]:FREQuency:OFFSet:STARt?`
Frequency Stop Offset	`[:SENSe]:FREQuency:OFFSet:STOP <rel_freq>`
	`[:SENSe]:FREQuency:OFFSet:STOP?`
Reference Level	`:DISPlay:WINDow[1]:TRACe:Y:[:SCALe]:RLEVel <real>`
	`:DISPlay:WINDow[1]:TRACe:Y:[:SCALe]:RLEVel?`
RF Attenuator	`[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl>`
	`[:SENSe]:POWer[:RF]:ATTenuation?`
RF Attenuator Auto/Manual	`[:SENSe]:POWer[:RF]:ATTenuation:AUTO ON|OFF|1|0`
	`[:SENSe]:POWer[:RF]:ATTenuation:AUTO?`
Level Offset	`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet <rel_power>`
	`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet?`
Level Offset State	`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe OFF|ON|0|1`
	`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe?`
Pre-Amp State	`[:SENSe]:POWer[:RF]:GAIN[:STATe] OFF|ON|0|1`
	`[:SENSe]:POWer[:RF]:GAIN[:STATe]?`
Scale Lines	`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE <line>`
	`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE?`
Reference Value	`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RVALue <real>`
	`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RVALue?`
External Mixer Mode	`[:SENSe]:MIXer[:STATe] ON|OFF|1|0`
	`[:SENSe]:MIXer[:STATe]?`
External Mixer Band	`[:SENSe]:MIXer:BAND VHP|EHP`
	`[:SENSe]:MIXer:BAND?`

2

SCPI Device Message Details

2.2.1   Carrier Frequency

[:SENSe]:FREQuency:CENTer <freq>

Carrier Frequency

Function

        Sets the carrier frequency.

Command

        `[:SENSe]:FREQuency:CENTer <freq>`

Parameter

`<freq>`		Carrier frequency
	Range	10 MHz to the upper limit, depending on the main unit
	Resolution	1 Hz
	Suffix code	`HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ`
		Hz is used when omitted.
	Initial value	2.000 GHz

Example of Use

        To set the carrier frequency to 2.000 GHz.

        `FREQ:CENT 2.000GHZ`

[:SENSe]:FREQuency:CENTer?

Carrier Frequency Query

Function

Reads out the set carrier frequency.

Query

```
[:SENSe]:FREQuency:CENTer?
```

Response

```
<freq>
```

Parameter

`<freq>`		Carrier frequency
	Range	10 MHz to the upper limit, depending on the main unit
	Resolution	1 Hz
		Value is returned in Hz units.

Example of Use

To read out the carrier frequency.

```
FREQ:CENT?
> 2000000000
```

2.2.2   Start Offset

[:SENSe]:FREQuency:OFFSet:STARt <rel_freq>

Frequency Start Offset

Function

This command sets the start of offset frequency.

Command

```
[:SENSe]:FREQuency:OFFSet:STARt <rel_freq>
```

Parameter

`<freq>`   Start of offset frequency.
   Range   10 Hz, 100 Hz, 1 kHz
   Suffix code   `HZ, KHZ`
                      Hz is used when omitted.
   Default   `10 Hz`

Example of Use

To set the start of offset frequency to 100 Hz.
```
FREQ:OFFS:STAR 100HZ
```

[:SENSe]:FREQuency: OFFSet:STARt?

Frequency Start Offset Query

Function

This command queries the start of offset frequency.

Command

```
[:SENSe]:FREQuency:OFFSet:STARt?
```

Response

`<freq>`

Parameter

`<freq>`   Start of offset frequency
   Range   10 Hz, 100 Hz, 1 kHz
                       No suffix code. Value is returned in Hz units.

Example of Use

To query the start of offset frequency.
```
FREQ:OFFS:STAR?
> 1000
```

2.2.3   Stop Offset

[:SENSe]:FREQuency:OFFSet:STOP <rel_freq>

Frequency Stop Offset

Function

        This command sets the stop of offset frequency.

Command

        `[:SENSe]:FREQuency:OFFSet:STOP <rel_freq>`

Parameter

`<rel_freq>`		Stop of offset frequency
	Range	100 kHz, 1 MHz, 10 MHz
	Suffix code	`HZ, KHZ, MHZ`
		Hz is used when omitted.
	Default	`10 MHz`

Example of Use

        To set the stop of offset frequency to 1 MHz.

        `FREQ:OFFS:STOP 1MHZ`

[:SENSe]:FREQuency: OFFSet:STOP?

Frequency Stop Offset Query

Function

        This command queries the stop of offset frequency.

Command

        `[:SENSe]:FREQuency:OFFSet:STOP?`

Response

        `<rel_freq>`

Parameter

`<rel_freq>`		Stop of offset frequency
	Range	100 kHz, 1 MHz, 10 MHz
		No suffix code. Value is returned in Hz units.

Example of Use

        To query the stop of offset frequency.

        `FREQ:OFFS:STOP?`

        `> 1000000`

2.2.4   Reference Level

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>

Reference Level

Function

Sets the reference level.

Command

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>

Parameter

<real>   Reference level

Range   −120.00 + Offset to 50.00 + Offset (Pre-Amp Off)

−120.00 + Offset to 30.00 + Offset (Pre-Amp On)

Resolution   0.01 dB

Suffix code   DBM

dBm is used when omitted.

Initial value   0 dBm

Details

The setting range when Pre Amp is Off is applied if the Option 008 Preamplifier (hereinafter referred to as "Option 008") is NOT installed.

Example of Use

To set the reference level to −15.00 dBm.

DISP:WIND:TRAC:Y:RLEV −15.00

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?

Reference Level Query

Function

Reads out the reference level.

Query

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
```

Response

```
<real>
```

Parameter

`<real>`		Reference level
	Range	−120.00 + Offset to 50.00 + Offset (Pre-Amp Off)
		−120.00 + Offset to 30.00 + Offset (Pre-Amp On)
	Resolution	0.01 dB
		Value is returned in dBm units.

Example of Use

To read out the reference level.
```
DISP:WIND:TRAC:Y:RLEV?
> -15.00
```

2.2.5   RF Attenuator

[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl>

RF Attenuator

Function

     Sets the attenuator.

Command

     `[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl>`

Parameter

     `<rel_ampl>`   Attenuator value

      Range   0 to 60 dB

      Resolution   2 dB step

      Suffix code   `DB`

             dB is used when omitted.

      Initial value 10 dB

Example of Use

     To set the attenuator to 10 dB.

     `POW:ATT 10`

[:SENSe]:POWer[:RF]:ATTenuation?

RF Attenuator Query

Function

Reads out the attenuation.

Query

```
[:SENSe]:POWer[:RF]:ATTenuation?
```

Response

```
<rel_ampl>
```

Parameter

`<rel_ampl>`	Attenuator value
Range	0 to 60 dB
Resolution	2 dB
	Value is returned in dB units.

Example of Use

To read out the attenuation.
```
POW:ATT?
> 10
```

2.2.6   RF Attenuator Auto/Manual

[:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF|ON|0|1

RF Attenuator Auto/Manual

Function

Enables/disables the automatic attenuation setting function.

Command

[:SENSe]:POWer[:RF]:ATTenuation:AUTO <switch>

Parameter

`<switch>`	Automatic attenuation setting function On/Off state
`0|OFF`	Disables the automatic attenuation setting function.
`1|ON`	Enables the automatic attenuation setting function (Initial value).

Example of Use

To enable the automatic attenuation setting function.
POW:ATT:AUTO ON

[:SENSe]:POWer[:RF]:ATTenuation:AUTO?

RF Attenuator Auto/Manual Query

Function

Reads out the automatic attenuation setting On/Off state.

Command

[:SENSe]:POWer[:RF]:ATTenuation:AUTO?

Response

<switch>

Parameter

`<switch>`	Automatic attenuation setting
`0`	The automatic attenuation setting is disabled.
`1`	The automatic attenuation setting is enabled.

Example of Use

To read out the automatic attenuation setting On/Off state.
POW:ATT:AUTO?
> 1

2.2   Setting Basic Parameter

2.2.7   Level Offset

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet <rel_power>

Level Offset Value

Function

Sets the offset value of the reference level.

Command

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet
<rel_power>

Parameter

<rel_power>   Offset value

    Range   −99.99 to +99.99 dB

    Resolution   0.01 dB

    Suffix code   DB

                dB is used when omitted.

    Initial value   0 dB

Example of Use

To set the level offset to 0.5 dB.

DISP:WIND:TRAC:Y:RLEV:OFFS 0.5

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet?

Level Offset Value Query

Function

Reads out the offset value of the reference level.

Query

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet?

Response

<rel_power>

Parameter

<rel_power>   Offset value

    Range   −99.99 to +99.99 dB

    Resolution   0.01 dB

Example of Use

To read out the level offset setting.

DISP:WIND:TRAC:Y:RLEV:OFFS?

> 0.50

2-21

2

SCPI Device Message Details

2.2.8   Level Offset State

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe OFF|ON|0|1
Level Offset State

Function

    Enables/disables the offset value of the reference level.

Command

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe
<switch>
```

Parameter

`<switch>`	Level Offset State
`OFF|0`	Disabled (Initial value)
`ON|1`	Enabled

Example of Use

    To enable the offset value of the reference level.
```
DISP:WIND:TRAC:Y:RLEV:OFFS:STAT ON
```

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe?
Level Offset State Query

Function

    Reads out the reference level offset function On/Off state.

Query

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe?
```

Response

```
<switch>
```

Parameter

`<switch>`	Reference level offset function state
`0`	Disabled
`1`	Enabled

Example of Use

    To read out the reference level offset function On/Off state.
```
DISP:WIND:TRAC:Y:RLEV:OFFS:STAT?
> 1
```

2.2.9   Pre Amp

[:SENSe]:POWer[:RF]:GAIN[:STATe] OFF|ON|0|1

Pre Amp State

Function

Sets Pre-amp to On/Off.

Command

[:SENSe]:POWer[:RF]:GAIN[:STATe] <switch>

Parameter

<switch>   Pre-amp On/Off
    OFF|0   Off (Initial value)
    ON|1   On

Details

This command is disabled when the Option 008 is not loaded.

Example of Use

To set Pre-amp to On.
POW:GAIN ON

[:SENSe]:POWer[:RF]:GAIN[:STATe]?

Pre Amp State Query

Function

Reads out Pre-amp On/Off.

Query

[:SENSe]:POWer[:RF]:GAIN[:STATe]?

Response

<switch>

Parameter

<switch>   Pre-amp On/Off
    0   Off
    1   On

Details

Returns "0" (Off) when the Option 008 is not loaded.

Example of Use

To read out the Pre-amp setting.
POW:GAIN?

> 1

2.2.10 Log Scale Line

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE <line>

Scale Lines

Function

> This command sets the Log Scale Line of level axis.

Command

> `:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE <line>`

Parameter

> `<line>`   Line value
>   Range   10, 16
>   Default   10

Example of Use

> To set the Log Scale Line to 16
> `DISP:WIND:TRAC:Y:SCAL:LINE 16`

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE?

Scale Lines

Function

> This command queries the Log Scale Line of level axis.

Command

> `:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE?`

Response

> `<line>`

Parameter

> `<line>`   Line value
>   Range   10, 16

Example of Use

> To query the Log Scale Line of level axis.
> `DISP:WIND:TRAC:Y:LINE?`
> `> 16`

2.2.11 Reference Value

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RVALue <real>

Reference Value

Function

This command sets the upper limit of level axis.

Command

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RVALue <real>

Parameter

<real>		Upper limit
	Range	−140 to −50 (Log Scale Line=10)
		−170 to −20 (Log Scale Line=16)
	Resolution	10 dBc/Hz
	Suffix code	
	Default	−50 (Log Scale Line=10)
		−20 (Log Scale Line=16)

Example of Use

To set the Reference Value to −70.

DISP:WIND:TRAC:Y:SCAL:RVAL -70

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]: RVALue?

Scale Lines

Function

This command queries the upper limit of level axis.

Command

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]: RVALue?

Response

Parameter

		Reference Value
	Range	−140 to −50 (Log Scale Line=10)
		−170 to −20 (Log Scale Line=16)

Example of Use

To query the upper limit of level axis.

DISP:WIND:TRAC:Y:RVALue?

> -140

2.2.12 External Mixer

[:SENSe]:MIXer[:STATe] ON|OFF|1|0

External Mixer Mode

Function

This command selects the internal mixer and external mixer.

Command

[:SENSe]:MIXer[:STATe] <switch>

Parameter

<switch>   External Mixer Switch
    ON|1   Selects the external mixer.
    OFF|0   Selects the internal mixer.

Details

This function is available only when Option 044/045 is installed for MS2830A.

To set the parameters related to the external mixer, use the Spectrum Analyzer function.

For details, refer to Section 2.20 "Setting External Mixer" in the *MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control).*

Example of Use

To use the external mixer.
MIX ON

[:SENSe]:MIXer[:STATe]?

External Mixer Mode Query

Function

This command queries the current mixer mode.

Command

```
[:SENSe]:MIXer[:STATe]?
```

Response

```
<status>
```

Parameter

`<status>`		External Mixer Switch
	1	Uses the external mixer.
	0	Uses the internal mixer.

Details

This function is available only when Option 044/045 is installed for MS2830A.

To set the parameters related to the external mixer, use the Spectrum Analyzer function.

For details, refer to Section 2.20 "Setting External Mixer" in the *MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control).*

Example of Use

To query the current external mixer switch state.
```
MIX?
> 1
```

[:SENSe]:MIXer:BAND VHP|EHP

External Mixer Band

Function

This command selects the band for High Performance Waveguide Mixer.

Command

[:SENSe]:MIXer:BAND <band>

Parameter

<band>	High Performance Waveguide Mixer Band
VHP	Band VHP (50.0 to 75.0 GHz, 8+) (Default)
EHP	Band EHP (60.0 to 90.0 GHz, 12–)

Details

This function is available only when Option 044/045 is installed for MS2830A.

When using High Performance Waveguide Mixer, set the parameters of the external mixer by using the Spectrum Analyzer function of the mainframe.

For details, refer to Section 2.20 "Setting External Mixer" in the *MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)*.

Example of Use

To set the band for High Performance Waveguide Mixer to Band EHP.
MIX:BAND EHP

[:SENSe]:MIXer:BAND?

External Mixer Band Query

Function

This command queries the band of the current High Performance Waveguide Mixer.

Command

```
[:SENSe]:MIXer:BAND?
```

Response

```
<band>
```

Parameter

`<band>`	High Performance Waveguide Mixer Band
VHP	Band VHP (50.0 to 75.0 GHz, 8+)
EHP	Band EHP (60.0 to 90.0 GHz, 12–)

Details

This function is available only when Option 044/045 is installed for MS2830A.

Example of Use

To query the band of the current High Performance Waveguide Mixer.
```
MIX:BAND?
```
```
> EHP
```

2.3 Utility Function

Table 2.3-1 lists device messages for utility functions to be measured.

Table 2.3-1   Utility Function

Function	Device Message
Erase Warm Up Message	`:DISPlay:ANNotation:WUP:ERASe`
Display Title	`:DISPlay:ANNotation:TITLe[:STATe] ON|OFF|1|0`
	`:DISPlay:ANNotation:TITLe[:STATe]?`
Title Entry	`:DISPlay:ANNotation:TITLe:DATA <string>`
	`:DISPlay:ANNotation:TITLe:DATA?`

2.3.1   Erase Warm Up Message

:DISPlay:ANNotation:WUP:ERASe

Erase Warm Up Message

Function

Erases the warm-up messages displayed right after activation.

Command

:DISPlay:ANNotation:WUP:ERASe

Example of Use

To erase warm-up messages.

DISP:ANN:WUP:ERAS

2.3.2   Display Title

:DISPlay:ANNotation:TITLe[:STATe] OFF|ON|0|1

Display Title

Function

Displays/hides the title.

Command

:DISPlay:ANNotation:TITLe[:STATe] <switch>

Parameter

<switch>	Title display On/Off
OFF|0	Off
ON|1	On (Initial value)

Example of Use

To display the title.

DISP:ANN:TITL ON

:DISPlay:ANNotation:TITLe[:STATe]?

Display Title Query

Function

Reads out On/Off of the title display.

Query

```
:DISPlay:ANNotation:TITLe[:STATe]?
```

Response

```
<switch>
```

Parameter

```
<switch>            Title display On/Off
   1                On
   0                Off
```

Example of Use

To read out the title display setting.
```
DISP:ANN:TITL?
> 1
```

2.3.3   Title Entry

:DISPlay:ANNotation:TITLe:DATA <string>

Title Entry

Function

Registers the title character string.

Command

```
:DISPlay:ANNotation:TITLe:DATA <string>
```

Parameter

```
<string>                Character string within 32 characters enclosed
                        by double quotation marks (" ") or single
                        quotation marks (' ')
```

Example of Use

To set the title character string.
```
DISP:ANN:TITL:DATA 'TEST'
```

:DISPlay:ANNotation:TITLe:DATA?

Title Entry Query

Function

    Reads out the title character string.

Query

    `:DISPlay:ANNotation:TITLe:DATA?`

Response

    `<string>`

Parameter

`<string>`	Character string within 32 characters enclosed by double quotation marks (" ") or single quotation marks (' ')

Example of Use

    To read out the title character string.

    `DISP:ANN:TITL:DATA?`

    `> TEST`

2.4 Common Measurement Function

Table 2.4-1 lists device messages for carrying out operations common to all the measurement functions.

Table 2.4-1   Common Measurement Function

Function	Device Message
Continuous Measurement	`:INITiate:CONTinuous OFF|ON|0|1`
	`:INITiate:CONTinuous?`
	`:INITiate:MODE:CONTinuous`
Single Measurement	`:INITiate:MODE:SINGle`
Initiate	`:INITiate[:IMMediate]`
Configure	`:CONFigure?`
Save Result Data	`:MMEMory:STORe:TRACe [<filename>[,<device>]]`

2.4.1   Measurement and Control

:INITiate:CONTinuous OFF|ON|0|1

Continuous Measurement

Function

Sets the measurement mode.

Command

    :INITiate:CONTinuous <switch>

Parameter

<switch>   Measurement mode
    0|OFF   Single measurement mode
    1|ON   Continuous measurement mode (Initial value)

Details

When set to On, the Continuous measurement mode is set and continuous measurement is started. When set to Off, the Single measurement mode is set and no measurement is performed.

Example of Use

To perform continuous measurement.
    INIT:CONT ON

:INITiate:CONTinuous?

Continuous Measurement Query

Function

Reads out the measurement mode.

Query

    :INITiate:CONTinuous?

Response

    <switch>

Parameter

<switch>   Measurement mode
    0   Single measurement mode
    1   Continuous measurement mode

Example of Use

To read out the measurement mode.
    INIT:CONT?
    > 0

:INITiate:MODE:CONTinuous

Continuous Measurement

Function

 Starts continuous measurement.

Command

 `:INITiate:MODE:CONTinuous`

Example of Use

 To perform continuous measurement.
 `INIT:MODE:CONT`

:INITiate:MODE:SINGle

Single Measurement

Function

 Starts single measurement.

Command

 `:INITiate:MODE:SINGle`

Details

 This command is an asynchronous command.
 Note that it does not support synchronized control in the continuous measurement mode.

Example of Use

 To perform single measurement.
 `INIT:MODE:SING`

:INITiate[:IMMediate]

Initiate

Function

Starts measurement in the selected measurement mode.

Command

```
:INITiate[:IMMediate]
```

Details

This command is an asynchronous command.
Note that it does not support synchronized control in the continuous measurement mode.

Example of Use

To start measurement in the selected measurement mode.
```
INIT
```

:CONFigure?

Configure Query

Function

Reads out the name of the current measurement function.

Query

```
:CONFigure?
```

Response

```
<mode>
```

Parameter

`<mode>`	Measurement function
`LPLot`	Log plot measurement

Example of Use

To read out the name of the measurement function.
```
CONF?
> LPL
```

2.4.2   Save Result Data

:MMEMory:STORe:TRACe [<filename>[,<device>]]

Save Result Data

Function

Saves the measurement result into a CSV file.

Command

:MMEMory:STORe:TRACe [<filename>[,<device>]]

Parameter

<filename>   File name

Character string within 32 characters (not including an extension) enclosed by double quotation marks " ") or single quotation marks (' ')

The following characters cannot be used:

¥ / : * ? " " ` ' < > |

When omitted, "WaveData date_sequencial number.csv" is automatically set.

<device>   Drive name

A,B,D,E,F,...

When omitted, drive D is automatically set.

Details

A sequential number from 00 to 99 is added to the file name when the file name is omitted. No more files can be saved if all the numbers through 99 have already been used.

The measurement result files are saved in the following directory of the specified drive:

/Anritsu Corporation/Signal Analyzer/User Data
     /Trace Data/Phase Noise

Up to 1000 files can be saved in the folder.

Example of Use

To save the measurement result into a file under the name "trace" in drive E.

MMEM:STOR:TRAC "trace",E

2.5 Log Plot Measurement

This section describes the device messages related to log plot measurement.

Table 2.5-1 lists the commands to perform log plot measurement and the queries to read out the results.

Table 2.5-1   Device Messages for Log Plot Measurement

Function	Device Message
Configure	`:CONFigure:LPLot`
Initiate	`:INITiate:LPLot`
Fetch	`:FETCh:LPLot[n]?`
Read/Measure	`:READ:LPLot[n]?`
	`:MEASure:LPLot[n]?`

Table 2.5-2 lists responses to Parameter n on Table 2.5-1.

Table 2.5-2   Responses to Log Plot Measurement Result

n	Result Mode	Response
1 or omitted	A/B	The average values obtained through measurement for the average count are returned in the following order, in comma-separated value format. 1. Carrier Level[dBm] 2. Carrier Frequency[Hz] ***Note:*** Carrier Frequency is the total result of the set carrier frequency and the frequency error. 3. −999.0 4. −999.0 5. −999.0 6. Phase noise level at the minimum offset frequency [dBc/Hz] 7. Phase noise level at the maximum offset frequency [dBc/Hz]
2	A/B	The number of data displayed on the log plot graph is returned.
3	A/B	The data displayed on the log plot graph are returned in comma-separated value format. Unit: dBc/Hz

Table 2.5-3 lists the commands to set a parameter for log plot measurement.

Table 2.5-3   Device Messages for Setting for Log Plot Measurement Parameter

Parameter	Device Message
Average Count	`[:SENSe]:LPLot:AVERage:COUNt <integer>`
	`[:SENSe]:LPLot:AVERage:COUNt?`

Table 2.5-4 lists the commands to set a marker and the queries to read out values at the marker position for log plot measurement.

Table 2.5-4   Device Messages for Marker of Log Plot Measurement

Parameter	Device Message
Marker Mode	`:CALCulate:LPLot:MARKer[n]:MODE <mode>`
	`:CALCulate:LPLot:MARKer[n]:MODE?`
Marker Width Start	`:CALCulate:LPLot:MARKer[n]:WIDTh:STARt <rel_freq>`
	`:CALCulate:LPLot:MARKer[n]:WIDTh:STARt?`
Marker Width Stop	`:CALCulate:LPLot:MARKer[n]:WIDTh:STOP <rel_freq>`
	`:CALCulate:LPLot:MARKer[n]:WIDTh:STOP?`
Marker Freq. Offset	`:CALCulate:LPLot:MARKer[n]:X <rel_freq>`
	`:CALCulate:LPLot:MARKer[n]:X?`
Marker Result	`:CALCulate:LPLot:Marker[n]:Y?`

2.5.1 Measure

:CONFigure:LPLot

Configure

Function

Selects the log plot measurement function. No measurement is performed.

Command

`:CONFigure:LPLot`

Example of Use

To select the log plot measurement.
`CONF:LPL`

:INITiate:LPLot

Initiate

Function

Performs log plot measurement.

Command

`:INITiate:LPLot`

Example of Use

To perform log plot measurement.
`INIT:LPL`

:FETCh:LPLot[n]?

Fetch

Function

Reads out the result of the log plot measurement.

Query

```
:FETCh:LPLot[n]?
```

Response

```
<carrier_level>,<carrier freq>,
-999.0,-999.0,-999.0,
<level_lower>,<level_upper>
```
(n = 1 or when omitted)
```
<data_point>
```
(n = 2)
```
<level_1>,<level_2>,<level_3>,
......
```
(n = 3)

Parameter

`<carrier level>`	Carrier level
`<carrier freq>`	Carrier frequency
`<level_lower>`	Phase noise level at the minimum offset frequency
`<level_upper>`	Phase noise level at the maximum offset frequency
`<data_point>`	Number of data
`<level_n>`	Phase noise level of the data n

Example of Use

To read out the result of the log plot measurement.
```
FETC:LPL?
> 0.00,2000000000,-999.0,-999.0,-999.0,-50.00,-150.00
```

:READ:LPLot[n]?

Read

Function

Reads out the result after the single measurement of the log plot is performed in the current setting value.

Query

:READ:LPLot[n]?

Response

Refer to :FETCh:LPLot[n]?

Example of Use

To perform the log plot measurement in order to read out the result.
READ:LPL?

Related Command

This command has the same function as the following one.
:MEASure:LPlot[n]?

:MEASure:LPLot[n]?

Measure

Function

Reads out the result after the single measurement of the log plot is performed in the current setting value.

Query

:MEASure:LPLot[n]?

Response

Refer to :FETCh:LPLot[n]?

Example of Use

To perform the log plot measurement in order to read out the result.
MEAS:LPL?

Related Command

This command has the same function as the following one.
:READ:LPLot[n]?

2.5.2　Average Count

[:SENSe]:LPLot:AVERage:COUNt <integer>

Average Count

Function

Sets the average count.

Command

[:SENSe]:LPLot:AVERage:COUNt <integer>

Parameter

<integer>　　　　　Average Count
　　　Range　　　　　1 to 999
　　　Resolution　　　1
　　　Initial value　　1

Example of Use

To set Average Count to 10.
LPL:AVER:COUN 10

[:SENSe]:LPLot:AVERage:COUNt?

Average Count Query

Function

Reads out the setting of the average count.

Query

[:SENSe]:LPLot:AVERage:COUNt?

Response

<integer>

Parameter

<integer>　　　　　Average Count
　　　Range　　　　　1 to 999
　　　Resolution　　　1

Example of Use

To read out the setting of the average count.
LPL:AVER:COUN?
> 50

2.5.3 Marker Mode

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:MODE
NORMal|INTEgralnoise|RMSNoise|JITTer|RESIdualfm|OFF

Marker Mode

Function

Sets the marker mode for the log plot measurement.

Command

:CALCulate:LPLot:MARKer[n]:MODE <mode>

Parameter

<n>	Marker number
1	Marker 1
2	Marker 2
3	Marker 3
4	Marker 4
5	Marker 5
6	Marker 6
7	Marker 7
8	Marker 8
When omitted	Marker 1

Note:

When Marker Mode is set to Integral Noise, RMS Noise, Jitter, or Residual FM, the marker is fixed to specified active marker.

<mode>	Marker mode
NORMal	Normal
INTEgralnoise	Integral Noise
RMSNoise	RMS Noise
JITTer	Jitter
RESIdualfm	Residual FM
OFF	Off
Initial value	Normal (Markers 1 to 5)
	Off (Markers 6 to 8)

Example of Use

To set the mode of marker 8 to Normal.
CALC:LPL:MARK8:MODE NORM

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:MODE?

Marker Mode Query

Function

Reads out the marker mode for the log plot measurement.

Query

:CALCulate:LPLot:MARKer[n]:MODE?

Response

<mode>

Parameter

<n>	Marker number
1	Marker 1
2	Marker 2
3	Marker 3
4	Marker 4
5	Marker 5
6	Marker 6
7	Marker 7
8	Marker 8
When omitted	Marker 1

<mode>	Marker mode
NORMal	Normal
INTEgralnoise	Integral Noise
RMSNoise	RMS Noise
JITTer	Jitter
RESIdualfm	Residual FM
OFF	Off

Example of Use

To read out the mode of marker 2.

CALC:LPL:MARK2:MODE?

> NORM

2.5.4 Analysis Width

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:WIDTh:STARt <rel_freq>

Marker Width Start

Function

This command sets the starting position of marker range at log plot measurement.

Command

:CALCulate:LPLot:MARKer[n]:WIDTh:STARt <rel_freq>

Parameter

<n>	Marker Number
1	Specifies marker 1
2	Specifies marker 2
3	Specifies marker 3
4	Specifies marker 4
5	Specifies marker 5
6	Specifies marker 6
7	Specifies marker 7
8	Specifies marker 8
When omitted	Specifies marker 1

<freq>	Frequency offset	
Range	10 Hz to 10 MHz	
Resolution	1 Hz	(10 Hz to 100 Hz)
	10 Hz	(100 Hz to 1 kHz)
	100 Hz	(1 kHz to 10 kHz)
	1 kHz	(10 kHz to 100 kHz)
	10 kHz	(100 kHz to 1 MHz)
Default	1 kHz	

Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
	Hz is used when omitted.

Example of Use

To set the starting position of marker range of marker 1 to 5 kHz.

CALC:LPL:MARK1:WIDT:STAR 5KHZ

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:WIDTh:STARt?

Marker Width Start Query

Function

This command queries the starting position of marker range at log plot measurement.

Query

:CALCulate:LPLot:MARKer[n]:WIDTh:STARt?

Response

<rel_freq>

Parameter

<n>	Marker Number
1	Specifies marker 1
2	Specifies marker 2
3	Specifies marker 3
4	Specifies marker 4
5	Specifies marker 5
6	Specifies marker 6
7	Specifies marker 7
8	Specifies marker 8
When omitted	Specifies marker 1

<rel_freq>	Frequency offset	
Range	Start Offset to Stop Offset	
Resolution	1 HZ	(10 Hz to 100 Hz)
	10 Hz	(100 Hz to 1 kHz)
	100 Hz	(1 kHz to 10 kHz)
	1 kHz	(10 kHz to 100 kHz)
	10 kHz	(100 kHz to 1 MHz)
	No suffix code. Value is returned in Hz units.	

Example of Use

To query the starting position of marker range of marker 1.
CALC:LPL:MARK1:WIDT:STAR?
> 5000

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:WIDTh:STOP <rel_freq>

Marker Width Stop

Function

This command sets the stop position of marker range at log plot measurement.

Command

```
:CALCulate:LPLot:MARKer[n]:WIDTh:STOP <rel_freq>
```

Parameter

`<n>`	Marker Number
1	Specifies marker 1
2	Specifies marker 2
3	Specifies marker 3
4	Specifies marker 4
5	Specifies marker 5
6	Specifies marker 6
7	Specifies marker 7
8	Specifies marker 8
When omitted	Specifies marker 1

`<freq>`	Frequency offset	
Range	Start Offset to Stop Offset	
Resolution	1 Hz	(10 Hz to 100 Hz)
	10 Hz	(100 Hz to 1 kHz)
	100 Hz	(1 kHz to 10 kHz)
	1 kHz	(10 kHz to 100 kHz)
	10 kHz	(100 kHz to 1 MHz)
Default	1 kHz	
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ	
	Hz is used when omitted.	

Example of Use

To set the stop position of marker range of marker 1 to 500 kHz.
```
CALC:LPL:MARK1:WIDT:STOP 500KHZ
```

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:WIDTh:STOP?

Marker Width Stop Query

Function

This command queries the stop position of marker range at log plot measurement.

Query

:CALCulate:LPLot:MARKer[n]:WIDTh:STARt?

Response

<rel_freq>

Parameter

<n>		Marker Number
	1	Specifies marker 1
	2	Specifies marker 2
	3	Specifies marker 3
	4	Specifies marker 4
	5	Specifies marker 5
	6	Specifies marker 6
	7	Specifies marker 7
	8	Specifies marker 8
	When omitted	Specifies marker 1

<rel_freq>		Frequency offset
	Range	Start Offset to Stop Offset
	Resolution	1 HZ (10 Hz to 100 Hz)
		10 Hz (100 Hz to 1 kHz)
		100 Hz (1 kHz to 10 kHz)
		1 kHz (10 kHz to 100 kHz)
		10 kHz (100 kHz to 1 MHz)
		No suffix code. Value is returned in Hz units.

Example of Use

To query the stop position of marker range of marker 1.
CALC:LPL:MARK1:WIDT:STOP?
> 500000

2.5.5   Marker Frequency Offset

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:X <rel_freq>

Marker Frequency Offset

Function

Sets the frequency offset of the marker for the log plot measurement.

Command

:CALCulate:LPLot:MARKer[n]:X <rel_freq>

Parameter

<n>	Marker number
1	Marker 1
2	Marker 2
3	Marker 3
4	Marker 4
5	Marker 5
6	Marker 6
7	Marker 7
8	Marker 8
When omitted	Marker 1

<rel_freq>	Frequency offset	
Range	Start Offset to Stop Offset	
Resolution	10 Hz	(100 Hz to 1 kHz)
	100 Hz	(1 to 10 kHz)
	1 kHz	(10 to 100 kHz)
	10 kHz	(100 kHz to 1 MHz)
Initial value	100 Hz	(Marker 1)
	1 kHz	(Marker 2)
	10 kHz	(Marker 3)
	100 kHz	(Marker 4)
	1 MHz	(Marker 5)
	1 MHz	(Marker 6)
	1 MHz	(Marker 7)
	1 MHz	(Marker 8)
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ	
	Hz is used when omitted.	

Example of Use

To set the frequency offset of marker 1 to 5 kHz.
CALC:LPL:MARK1:X 5KHZ

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:X?

Marker Frequency Offset Query

Function

> Reads out the frequency offset of the marker for the log plot measurement.

Query

> :CALCulate:LPLot:MARKer[n]:X?

Response

> <rel_freq>

Parameter

<n>	Marker number
1	Marker 1
2	Marker 2
3	Marker 3
4	Marker 4
5	Marker 5
6	Marker 6
7	Marker 7
8	Marker 8
When omitted	Marker 1

<rel_freq>	Frequency offset	
Range	Start Offset to Stop Offset	
Resolution	10 Hz	(100 Hz to 1 kHz)
	100 Hz	(1 to 10 kHz)
	1 kHz	(10 to 100 kHz)
	10 kHz	(100 kHz to 1 MHz)
	Value is returned in Hz units.	

Example of Use

> To read out the frequency offset of marker 1.
> CALC:LPL:MARK1:X?
> > 5000

2.5.6   Marker Result

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:Y?

Marker Result

Function

Reads out the phase noise level of the marker for the log plot measurement.

Command

:CALCulate:LPLot:MARKer[n]:Y?

Response

Parameter

<n>	Marker number
1	Marker 1
2	Marker 2
3	Marker 3
4	Marker 4
5	Marker 5
6	Marker 6
7	Marker 7
8	Marker 8
When omitted	Marker 1

<level>	Phase noise level
	Value is returned in dBc/Hz units.

Example of Use

To read out the phase noise level of marker 2.

CALC:LPL:MARK2:Y?

> -150.0

This chapter describes the SCPI commands and the Status register for querying application statuses.

3

SCPI Status Register

3.1 Querying Measurement Status

:STATus:ERRor?

Measurement Status Query

Function

Queries the measurement status.

Query

:STATus:ERRor?

Response

<status>

Parameter

<status> Measurement status
  Value = bit0 + bit1 + bit2 + bit3 + bit4 + bit5 + bit6
      + bit7 + bit8 + bit9 + bit10 + bit11 + bit12
      + bit13 + bit14 + bit15

bit0 : $2^0 = 1$		Not measured
bit1 : $2^1 = 2$		Exceeded the level.
bit2 : $2^2 = 4$		(Unused)
bit3 : $2^3 = 8$		(Unused)
bit4 : $2^4 = 16$		(Unused)
bit5 : $2^5 = 32$		(Unused)
bit6 : $2^6 = 64$		(Unused)
bit7 : $2^7 = 128$		(Unused)
bit8 : $2^8 = 256$		(Unused)
bit9 : $2^9 = 512$		(Unused)
bit10 : $2^{10} = 1024$		(Unused)
bit11 : $2^{11} = 2048$		(Unused)
bit12 : $2^{12} = 4096$		(Unused)
bit13 : $2^{13} = 8192$		(Unused)
bit14 : $2^{14} = 16384$		(Unused)
bit15 : $2^{15} = 32768$		(Unused)

  Range 0 to 65535

Details

0 is returned when terminated normally.

Example of Use

To query the measurement status.

:STAT:ERR?

> 0

3.2 STATus:QUEStionable Register

Fig. 3.2-1, Table 3.2-1, Fig. 3.2-2, and Table 3.2-2 show the layer structure of the QUEStionable Status register.

Fig. 3.2-1　QUEStionable Status Register

Table 3.2-1　Bit Definition of QUEStionable Status Register

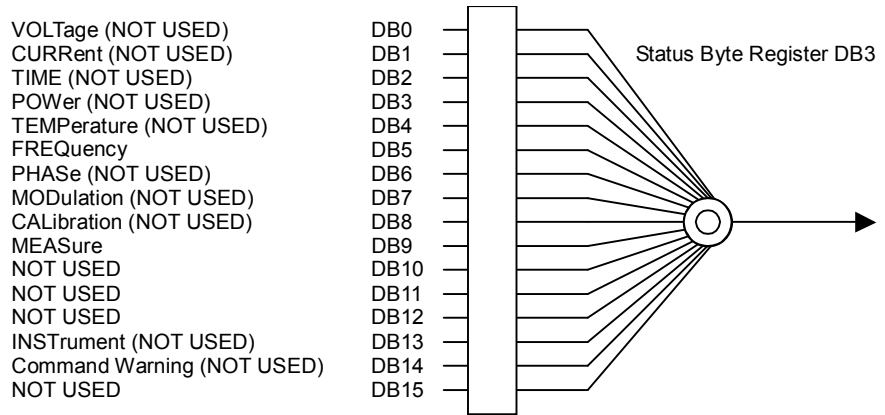| Bit	Definition
DB5	Unlock Reference Clock
DB9	QUEStionable Measure Register Summary
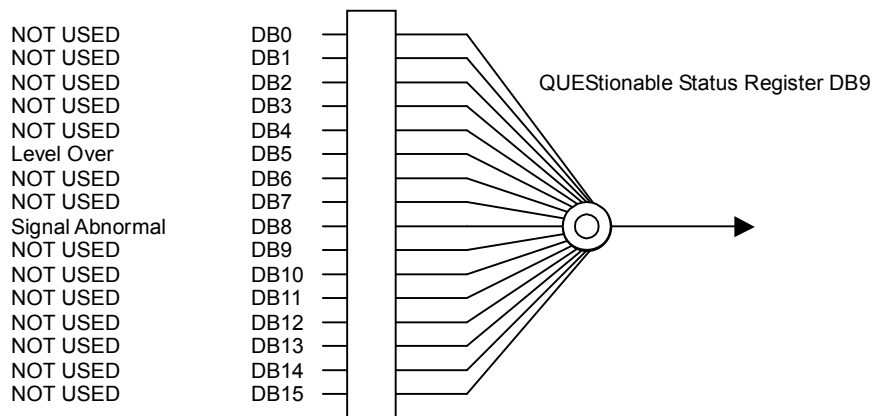
Fig. 3.2-2　QUEStionable Measure Register

Table 3.2-2　Bit Definition of QUEStionable Measure Register

Bit	Definition
DB5	Exceeded the level.
DB8	Signal abnormal

3

SCPI Status Register

Table 3.2-3 lists the device messages for the QUEStionable Status register.

Table 3.2-3   Device Messages for QUEStionable Status Register

Function	Device Message
Questionable Status Register Event	`:STATus:QUEStionable[:EVENt]?`
Questionable Status Register Condition	`:STATus:QUEStionable:CONDition?`
Questionable Status Register Enable	`:STATus:QUEStionable:ENABle <integer>`
	`:STATus:QUEStionable:ENABle?`
Questionable Status Register Negative Transition	`:STATus:QUEStionable:NTRansition <integer>`
	`:STATus:QUEStionable:NTRansition?`
Questionable Status Register Positive Transition	`:STATus:QUEStionable:PTRansition <integer>`
	`:STATus:QUEStionable:PTRansition?`
Questionable Measure Register Event	`:STATus:QUEStionable:MEASure[:EVENt]?`
Questionable Measure Register Condition	`:STATus:QUEStionable:MEASure:CONDition?`
Questionable Measure Register Enable	`:STATus:QUEStionable:MEASure:ENABle <integer>`
	`:STATus:QUEStionable:MEASure:ENABle?`
Questionable Measure Register Negative Transition	`:STATus:QUEStionable:MEASure:NTRansition <integer>`
	`:STATus:QUEStionable:MEASure:NTRansition?`
Questionable Measure Register Positive Transition	`:STATus:QUEStionable:MEASure:PTRansition <integer>`
	`:STATus:QUEStionable:MEASure:PTRansition?`

:STATus:QUEStionable[:EVENt]?

Questionable Status Register Event

Function

Queries the event register of the QUEStionable Status register.

Query

```
:STATus:QUEStionable[:EVENt]?
```

Response

```
<integer>
```

Parameter

`<integer>`		Byte summation of event register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the contents of the event register of the QUEStionable Status register.
```
:STAT:QUES?
> 0
```

:STATus:QUEStionable:CONDition?

Questionable Status Register Condition

Function

Queries the condition register of the QUEStionable Status register.

Query

```
:STATus:QUEStionable:CONDition?
```

Response

```
<integer>
```

Parameter

`<integer>`		Byte summation of condition register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the content of the condition register of the QUEStionable Status register.
```
:STAT:QUES:COND?
> 0
```

:STATus:QUEStionable:ENABle <integer>

Questionable Status Register Enable

Function

        Sets the event enable register of the QUEStionable Status register.

Command

        `:STATus:QUEStionable:ENABle <integer>`

Parameter

`<integer>`	Byte summation of event enable register
Resolution	1
Range	0 to 65535

Example of Use

        To set the event enable register of the QUEStionable Status Register to 16.

        `:STAT:QUES:ENAB 16`

:STATus:QUEStionable:ENABle?

Questionable Status Register Enable Query

Function

        Queries the event enable register of the QUEStionable Status register.

Query

        `:STATus:QUEStionable:ENABle?`

Response

        `<integer>`

Parameter

`<integer>`	Byte summation of event enable register
Resolution	1
Range	0 to 65535

Example of Use

        To query the event enable register of the QUEStionable Status Register.

        `:STAT:QUES:ENAB?`

        `> 16`

:STATus:QUEStionable:NTRansition <integer>

Questionable Status Register Negative Transition

Function

Sets the transition filter (negative transition) of the QUEStionable Status register.

Command

```
:STATus:QUEStionable:NTRansition <integer>
```

Parameter

<integer>   Byte summation of transition filter (negative transition)

	Resolution	1
	Range	0 to 65535

Example of Use

To set the transition filter (negative transition) of the QUEStionable Status register to 16.

```
:STAT:QUES:NTR 16
```

:STATus:QUEStionable:NTRansition?

Questionable Status Register Negative Transition Query

Function

Queries the transition filter (negative transition) of the QUEStionable Status register.

Query

```
:STATus:QUEStionable:NTRansition?
```

Response

```
<integer>
```

Parameter

<integer>   Byte summation of transition filter (negative transition)

	Resolution	1
	Range	0 to 65535

Example of Use

To query the transition filter (negative transition) of the QUEStionable Status register.

```
:STAT:QUES:NTR?
> 16
```

:STATus:QUEStionable:PTRansition <integer>

Questionable Status Register Positive Transition

Function

Sets the transition filter (negative transition) of the QUEStionable Status register.

Command

:STATus:QUEStionable:PTRansition <integer>

Parameter

<integer>   Byte summation of transition filter (positive transition)

Resolution   1
Range   0 to 65535

Example of Use

To set the transition filter (positive transition) of the QUEStionable Status Register to 16.
:STAT:QUES:PTR 16

:STATus:QUEStionable:PTRansition?

Questionable Status Register Positive Transition Query

Function

Queries the transition filter (positive transition) of the QUEStionable Status Register.

Query

:STATus:QUEStionable:PTRansition?

Response

<integer>

Parameter

<integer>   Byte summation of transition filter (positive transition)

Resolution   1
Range   0 to 65535

Example of Use

To query the transition filter (positive transition) of the QUEStionable Status Register.
:STAT:QUES:PTR?
> 16

:STATus:QUEStionable:MEASure[:EVENt]?

Questionable Measure Register Event

Function

Queries the event register of the QUEStionable Measure Register.

Query

`:STATus:QUEStionable[:EVENt]?`

Response

`<integer>`

Parameter

`<integer>`		Byte summation of event register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the content of the event register of the QUEStionable Measure Register.

`:STAT:QUES?`

`> 0`

:STATus:QUEStionable:MEASure:CONDition?

Questionable Measure Register Condition

Function

Queries the condition register of the QUEStionable Measure register.

Query

`:STATus:QUEStionable:CONDition?`

Response

`<integer>`

Parameter

`<integer>`		Byte summation of condition register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the content of the condition register of the QUEStionable Measure register.

`:STAT:QUES:COND?`

`> 0`

:STATus:QUEStionable:MEASure:ENABle <integer>

Questionable Measure Register Enable

Function

        Sets the event enable register of the QUEStionable Measure register.

Command

        `:STATus:QUEStionable:ENABle <integer>`

Parameter

        `<integer>`   Byte summation of event enable register
            Resolution   1
            Range   0 to 65535

Example of Use

        To set the event enable register of the QUEStionable Measure register to 16.
        `:STAT:QUES:ENAB 16`

:STATus:QUEStionable:MEASure:ENABle?

Questionable Measure Register Enable Query

Function

        Queries the event enable register of the QUEStionable Measure register.

Query

        `:STATus:QUEStionable:ENABle?`

Response

        `<integer>`

Parameter

        `<integer>`   Byte summation of event enable register
            Resolution   1
            Range   0 to 65535

Example of Use

        To query the event enable register of the QUEStionable Measure Register.
        `:STAT:QUES:ENAB?`
        `> 16`

:STATus:QUEStionable:MEASure:NTRansition <integer>

Questionable Measure Register Negative Transition

Function

> Sets the transition filter (negative transition) of the QUEStionable Measure register.

Command

> :STATus:QUEStionable:NTRansition <integer>

Parameter

> <integer>   Byte summation of transition filter (negative transition)
>
>> Resolution   1
>>
>> Range   0 to 65535

Example of Use

> To set the transition filter (negative transition) of the QUEStionable Measure register to 16.
>
> :STAT:QUES:NTR 16

:STATus:QUEStionable:MEASure:NTRansition?

Questionable Measure Register Negative Transition Query

Function

> Queries the transition filter (negative transition) of the QUEStionable Measure register.

Query

> :STATus:QUEStionable:NTRansition?

Response

> <integer>

Parameter

> <integer>   Byte summation of transition filter (negative transition)
>
>> Resolution   1
>>
>> Range   0 to 65535

Example of Use

> To query the transition filter (negative transition) of the QUEStionable Measure register.
>
> :STAT:QUES:NTR?
>
> > 16

:STATus:QUEStionable:MEASure:PTRansition <integer>

Questionable Measure Register Positive Transition

Function

Sets the transition filter (positive transition) of the QUEStionable Measure register.

Command

:STATus:QUEStionable:PTRansition <integer>

Parameter

<integer>	Byte summation of transition filter (positive transition)

	Resolution	1
	Range	0 to 65535

Example of Use

To set the transition filter (positive transition) of the QUEStionable Measure register to 16.

:STAT:QUES:PTR 16

:STATus:QUEStionable:MEASure:PTRansition?

Questionable Measure Register Positive Transition Query

Function

Queries the transition filter (positive transition) of the QUEStionable Measure register.

Query

:STATus:QUEStionable:PTRansition?

Response

<integer>

Parameter

<integer>	Byte summation of transition filter (positive transition)

	Resolution	1
	Range	0 to 65535

Example of Use

To query the transition filter (positive transition) of the QUEStionable Measure register.

:STAT:QUES:PTR?

> 16

3.3 STATus:OPERation Register

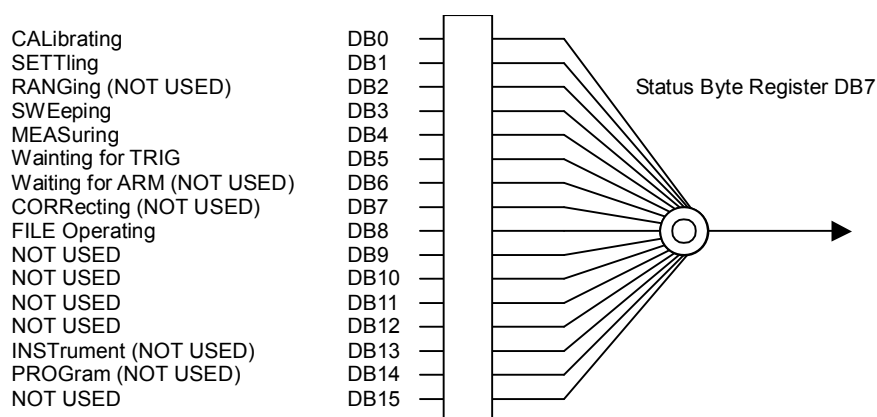Fig. 3.3-1 and Table 3.3-1 show the layer structure of the OPERation Status register.

```
CALibrating                    DB0
SETTling                       DB1
RANGing (NOT USED)             DB2                    Status Byte Register DB7
SWEeping                       DB3
MEASuring                      DB4
Wainting for TRIG              DB5
Waiting for ARM (NOT USED)     DB6
CORRecting (NOT USED)          DB7
FILE Operating                 DB8
NOT USED                       DB9
NOT USED                       DB10
NOT USED                       DB11
NOT USED                       DB12
INSTrument (NOT USED)          DB13
PROGram (NOT USED)             DB14
NOT USED                       DB15
```

Fig. 3.3-1   OPERation Status Register

Table 3.3-1   Bit Definition of OPERation Status Register

Bit	Definition
DB0	Executing CAL
DB1	Displaying Warm Up
DB3	Measuring (fixed to 1 in Continuous)
DB5	Waiting for trigger
DB8	Manipulating file

Table 3.3-2 lists the device messages for the OPERation Status register.

Table 3.3-2   Device Messages for OPERation Status Register

Function	Device Message
Operation Status Register Event	`:STATus:OPERation[:EVENt]?`
Operation Status Register Condition	`:STATus:OPERation:CONDition?`
Operation Status Register Enable	`:STATus:OPERation:ENABle <integer>`
	`:STATus:OPERation:ENABle?`
Operation Status Register Negative Transition	`:STATus:OPERation:NTRansition <integer>`
	`:STATus:OPERation:NTRansition?`
Operation Status Register Positive Transition	`:STATus:OPERation:PTRansition <integer>`
	`:STATus:OPERation:PTRansition?`

3

SCPI Status Register

:STATus:OPERation[:EVENt]?

Operation Status Register Event

Function

> Queries the event register of the OPERation Status register.

Query

> :STATus:OPERation[:EVENt]?

Response

> <integer>

Parameter

> <integer>   Byte summation of event register
> > Resolution   1
> > Range   0 to 65535

Example of Use

> To query the content of the event register of OPERation Status register.
> :STAT:OPER?
> > 0

:STATus:OPERation:CONDition?

Operation Status Register Condition

Function

> Queries the condition register of the OPERation Status Register.

Query

> :STATus:OPERation:CONDition?

Response

> <integer>

Parameter

> <integer>   Byte summation of condition register
> > Resolution   1
> > Range   0 to 65535

Example of Use

> To query the content of the condition register of the OPERation Status register.
> :STAT:OPER:COND?
> > 0

:STATus:OPERation:ENABle <integer>

Operation Status Register Enable

Function

Sets the event enable register of the OPERation Status register.

Command

```
:STATus:OPERation:ENABle <integer>
```

Parameter

`<integer>`		Byte summation of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

To set the event enable register of the OPERation Status register to 16.
```
:STAT:OPER:ENAB 16
```

:STATus:OPERation:ENABle?

Operation Status Register Enable Query

Function

Queries the event enable register of the OPERation Status register.

Query

```
:STATus:OPERation:ENABle?
```

Response

```
<integer>
```

Parameter

`<integer>`		Byte summation of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the event enable register of the OPERation Status register.
```
:STAT:OPER:ENAB?
```
```
> 16
```

:STATus:OPERation:NTRansition <integer>

Operation Status Register Negative Transition

Function

Sets the transition filter (negative transition) of the OPERation Status register.

Command

```
:STATus:OPERation:NTRansition <integer>
```

Parameter

<integer>		Byte summation of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To set the transition filter (negative transition) of the OPERation Status register to 16.

```
:STAT:OPER:NTR 16
```

:STATus:OPERation:NTRansition?

Operation Status Register Negative Transition Query

Function

Queries the transition filter (negative transition) of the OPERation Status register.

Query

```
:STATus:OPERation:NTRansition?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To query the transition filter (negative transition) of the OPERation Status register.

```
:STAT:OPER:NTR?
> 16
```

:STATus:OPERation:PTRansition <integer>

Operation Status Register Positive Transition

Function

Sets the transition filter (positive transition) of the OPERation Status register.

Command

`:STATus:OPERation:PTRansition <integer>`

Parameter

<integer>   Byte summation of transition filter (positive transition)

    Resolution   1
    Range   0 to 65535

Example of Use

To set the transition filter (positive transition) of the OPERation Status register to 16.

`:STAT:OPER:PTR 16`

:STATus:OPERation:PTRansition?

Operation Status Register Positive Transition Query

Function

Queries the transition filter (positive transition) of the OPERation Status register.

Query

`:STATus:OPERation:PTRansition?`

Response

`<integer>`

Parameter

<integer>   Byte summation of transition filter (positive transition)

    Resolution   1
    Range   0 to 65535

Example of Use

To query the transition filter (positive transition) of the OPERation Status register.

`:STAT:OPER:PTR?`

`> 16`

3

SCPI Status Register